

We claim:

1. A process for shape sorting an aspect ratio material, the process comprising:

5 providing particles of the aspect ratio material having a size less than a preselected maximum size;

10 separating the particles of the aspect ratio material into a plurality of particle streams based on particle size, each particle stream being formed substantially from particles of the aspect ratio material having a size within a range of particle sizes; and

15 sorting the particles of the aspect ratio material in at least one of the plurality of particle streams based on particle shape into a relatively high aspect ratio constituent and a relatively low aspect ratio constituent.

2. A process as claimed in claim 1 in which the aspect ratio material is comprised of wollastonite ore.

20 3. A process as claimed in claim 2 in which the preselected maximum size of the particles of the aspect ratio material is about 3.5 mm.

25 4. A process as claimed in claim 2 further comprising a step of size reducing the wollastonite ore into the particles of the aspect ratio material having the size less than the preselected maximum size.

5. A process as claimed in claim 4 in which the size reducing step comprises:

delivering the wollastonite ore into a size reducing apparatus;

30 separating particles from the size reducing apparatus into particles having a size greater than the preselected maximum size and particles having a size less than the preselected maximum size;

feeding particles greater than the preselected maximum size back into the size

delivering the particles of the aspect ratio material having the size less than the preselected maximum size for separating.

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6. A process as claimed in claim 4 in which the size reducing step is comprised of at least two stages, with particles being size reduced to an intermediate size at a first stage and delivered to at least one subsequent stage for further size reducing until the wollastonite ore is size reduced sufficiently to produce the particles of the aspect ratio material having the size less than the preselected maximum size.

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7. A process as claimed in claim 2 in which the separating step comprises delivering the particles of the aspect ratio material to a particle size separating apparatus and separating the particles of the aspect ratio material into the plurality of particle streams with the particle size separating apparatus.

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8. A process as claimed in claim 7 in which the particle size separating apparatus comprises at least one mesh screen having a mesh screen size and wherein the separating step is comprised of screening the particles of the aspect ratio material with the mesh screen.

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9. A process as claimed in claim 8 in which screening the particles of the aspect ratio material with the mesh screen creates one particle stream in which the particles of the aspect ratio material have a size greater than the mesh screen size and another particle stream in which the particles of the aspect ratio material have a size less than the mesh screen size.

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10. A process as claimed in claim 7 in which the particle size separating apparatus comprises a plurality of mesh screens having different mesh screen sizes and wherein the separating step is comprised of selectively screening the particles of the aspect ratio material with the plurality of mesh screens to create the plurality of particle streams.

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11. A process as claimed in claim 2 in which each particle stream created in the separating step includes particles of the aspect ratio material which have a size which is outside of the range of particle sizes of the particle stream in an amount less than about 20% by weight of the particle stream.

12. A process as claimed in claim 2 in which each particle stream created in the separating step includes particles of the aspect ratio material which have a size which is outside of the range of particle sizes of the particle stream in an amount less than about 10% by weight of the particle stream.

13. A process as claimed in claim 2 in which the sorting step comprises delivering the particle stream to be sorted to a particle shape sorting apparatus and sorting the particles of the aspect ratio material in the particle stream with the particle shape sorting apparatus.

14. A process as claimed in claim 13 in which the particle shape sorting apparatus comprises grain sorting apparatus.

15. A process as claimed in claim 2 in which a plurality of the particle streams is to be sorted, in which the plurality of the particle streams to be sorted is delivered to a plurality of particle shape sorting apparatus, and in which the plurality of the particle streams to be sorted is sorted in the plurality of particle shape sorting apparatus to produce a plurality of relatively high aspect ratio constituents and a plurality of relatively low aspect ratio constituents.

16. A process as claimed in claim 2 including cleaning of the relatively low aspect ratio constituent to remove gangue.

17. A process as claimed in claim 16 including grinding of the relatively low aspect ratio constituent after cleaning.

18. A process as claimed in claim 2 including grinding of the relatively high aspect ratio constituent to produce a product having a reduced particle size.

19. A relatively high aspect ratio constituent of wollastonite ore produced according to the process of claim 2.

20. A system for shape sorting an aspect ratio material, the system comprising:

particle size separating apparatus to separate particles of the aspect ratio material

having a size less than a preselected maximum size into a plurality of particle streams based on particle size, each particle stream being formed substantially from particles of the aspect ratio material having a size within a range of particle sizes; and

5 particle shape sorting apparatus associated with at least one of the plurality of particle streams to sort the particles of the aspect ratio material in the particle stream based on particle shape into a relatively high aspect ratio constituent and a relatively low aspect constituent.

10 21. A process as claimed in claim 20 in which the aspect ratio material is comprised of wollastonite ore.

22. A system as claimed in claim 21 in which the particle size separating apparatus comprises at least one mesh screen.

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23. A system as claimed in claim 21 in which the particle shape sorting apparatus comprises grain sorting apparatus.

20 24. A system as claimed in claim 21 in which a plurality of particle shape sorting apparatus is associated with a plurality of the particle streams for sorting the plurality of particle streams based on particle shape to produce a plurality of relatively high aspect ratio constituents and a plurality of relatively low aspect ratio constituents.

25 25. A system as claimed in claim 21 further comprising a size reducing apparatus to size reduce the wollastonite ore into the particles of the aspect ratio material having the size less than the preselected maximum size.

26. A system as claimed in claim 25 in which the size reducing apparatus is selected so that it will not significantly diminish the aspect ratio of the aspect ratio material.

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27. A constituent of wollastonite ore comprising the following properties:

at least 80% by weight of the constituent of wollastonite ore having a particle size within a range of particle sizes, wherein the range of particle sizes is defined by an

upper limit particle size and a lower limit particle size, and wherein the ratio of the upper limit particle size to the lower limit particle size is less than about 2; and

a Loss-on-Ignition value of less than about 2%.

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28. A constituent of wollastonite ore as claimed in claim 27 in which the ratio of the upper limit particle size to the lower limit particle size is between about 1.2 and 2.

29. A constituent of wollastonite ore as claimed in claim 27 in which the ratio of the upper limit particle size to the lower limit particle size is between about 1.2 and 1.6.

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30. A constituent of wollastonite ore as claimed in claim 27 in which at least 90% by weight of the constituent of wollastonite ore has a particle size within the range of particle sizes.

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31. A constituent of wollastonite ore as claimed in claim 30 in which the ratio of the upper limit particle size to the lower limit particle size is between about 1.2 and 1.6.